

New Maintenance Technologies: Optimize the Multiple-Site Deployment Economics

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Partners, NAVAIR LMTCE

- **LMTCE: Lead Maintenance Technology Center, Environment**
 - Identify Environmental, Safety, and Health Technology Needs
 - Ensure Technology Transition Process Answers Needs
 - Sponsor: Chief of Naval Operations, Environmental Programs, Safety, and Occupational Health (N45)
 - IPT Chair: NAVAIR Acquisition Support (8.4)
 - Technology Assessment Support: SAIC



Challenge

- **Environmental Technologies often Promise:**
 - Lower Costs
 - Improved Environmental Performance
- **Need Impact Analyses on Technologies for *Military Applications***
 - Assess Life Cycle Benefits, Productivity, Energy, and Capital / Operating Costs
 - Optimize Technology Deployment Strategy



Project Background

- **This project is part of the following technology transition process:**
 - Needs Assessments
 - › **Impact Analyses**
 - Including economic and environmental metrics
 - Implementation Data Packages (IDP's)
 - Transition plans



Sample of Technologies Analyzed

- **Powdercoat & Electrocoat Painting**
- **Low and Zero VOC Topcoats**
- **Non Chrome Primer**
- **Conversion Coat Alternative**
- **Non Chrome Sealants**
- **Non-HAP Paint Purge Solvent**
- **Non-HAP Chemical Stripper**
- **Flashjet Stripper (Gantry & Mobile)**
- **Plating: Zinc-Nickel, Tin-Zinc, Al-Mn, Cermet, HVOF**
- **Glass Media Lease/ Recycling**
- **CO2 Retrofit of Halon Extinguishers**
- **Engine Fire Suppression Bottle Maintenance Cycle Extension**
- **Steam Catapult Modifications**
- **Alternative Chaff**
- **Alternative Ordnance Materials**



Approach

- **Data from Technology and Site Experts**
 - Cognizant Materials Engineers, Sites, & Vendors
- **Use Standard Cost-Benefit Methodology**
- **Develop Dynamic Tool for Technology Assessment**
 - Site-to-site workload and processing drivers
 - Standard technology assumptions
 - Default cost factors
 - Allows for trade-off and sensitivity analyses
- **Assess Environmental Impact**



Technical Data Resources

- **NAVAIR Pollution Prevention Technology Principal Investigators and Project Leaders**
- **NFESC Environmental Systems Allocation (ESA) database for estimating factors**
- **CNO N-88 Aircraft Inventory Program File**
- **NAVAIR ECHO database for materials data**
- **MSDS data**
- **Vendor data**



Cost-Benefit Analysis Method

- **NAVAIRINST 11010.5A**, Management of the Naval Air Systems Command Industrial Capabilities Group Capital Purchases Program (CPP)
- **OMB Circular A-11**, Planning, Budgeting, and Acquisition of Capital Assets (Part 3)
- **OMB Circular A-94**, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs




Environmental Technology Impact Analysis


Powdercoat vs. Spray Paint		Inputs	Criteria:		100,000	150,000	*	*
Start Year:	1999	Baseline			M62535	M60169	M00146	
Site:		NADEP JAX	NADEP CP	NADEP NI	MCAS (H) TUST	MCAS BEAUFORT S	MCAS CHERRY POIN	
Site Cost Drivers	Summary	D	D	D	I	I	I	
Aircraft Inventory	2,430	56	108	130	64	87	97	
Sq. feet painted	5,577,780	350,000	300,000	227,500	140,800	191,400	21	
Labor Rate	\$47.36	\$60.00	\$60.00	\$60.00	\$45.00	\$45.00	\$	
# Sites	21	1	1	1	1	1	1	
# Dry Filter Booths	33	4	5	6	1	1	1	
% Technology Replacement	70.0%	70%	70%	70%	70%	70%	70%	
VOC Control ? (yes=1*booths,no=0)	15	4	5	6	0	0	0	
Waste Disposal Cost (\$/lb)	\$1.37	\$1.32	\$1.40	\$0.80	\$1.40	\$1.40	\$1.40	

Summary Results	Metric	Summary	Baseline
Environmental, Safety, and Health	Materials	1.32E+05	8.27E+03
	TRI Chem.	4.00E+04	2.51E+03
	Waste	9.07E+04	5.69E+03
Economic	Hazardous Substance Reduction (lb/yr)		
	Payback (yr)	2.92	0.61
	ROR	34%	163%
	IRR	34%	84%
	NPV	\$8,876,067	\$1,143,745

Technology Assumptions	Sensitivity Model	Criteria Override
Default Cost Factors	Sensitivity Chart	Selected Site List
Baseline Calculations	Summary Calculations	
Baseline CBA Report	Summary CBA Report	
Baseline TRI Reduction	Summary TRI Reduction	
Actual NPV Cashflows		



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Inputs & Summary Results	Sensitivity	Site List Report	Report table	Materials	Material
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Economic & Environmental Metrics

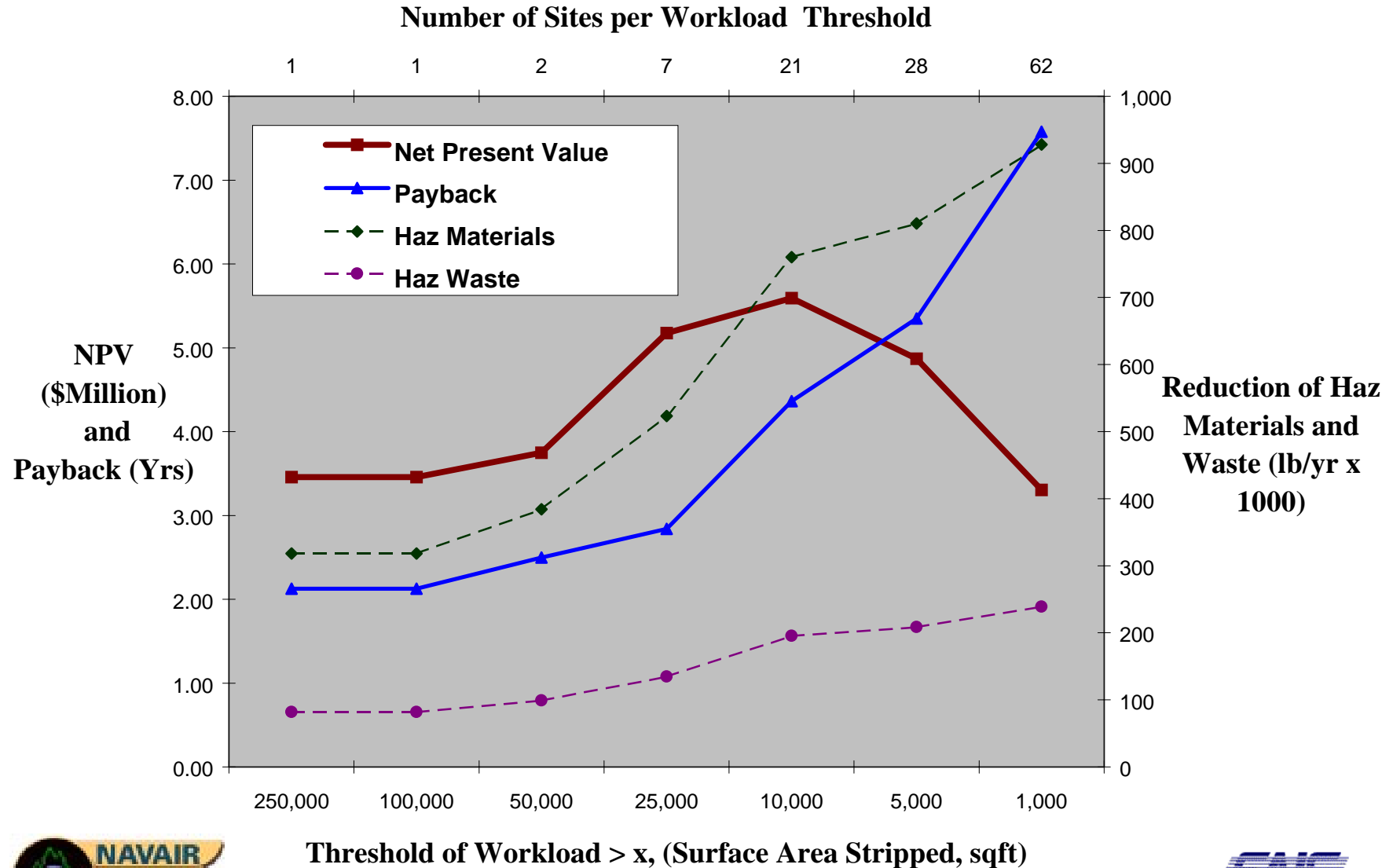
Deployment Sites	Investment	Payback (yr)	Internal Rate of Return	Net Present Value
25	\$4,812,500	3.49	28%	\$8,323,551
Baseline	\$192,500	0.61	84%	\$1,143,745

Deployment Sites	TRI Materials Reductions (lbs/yr)	TRI Chemicals Reductions (lbs/yr)	Haz Waste Reduction (lbs/yr)
25	140,439	42,581	96,585
Baseline	8,273	2,508	5,690



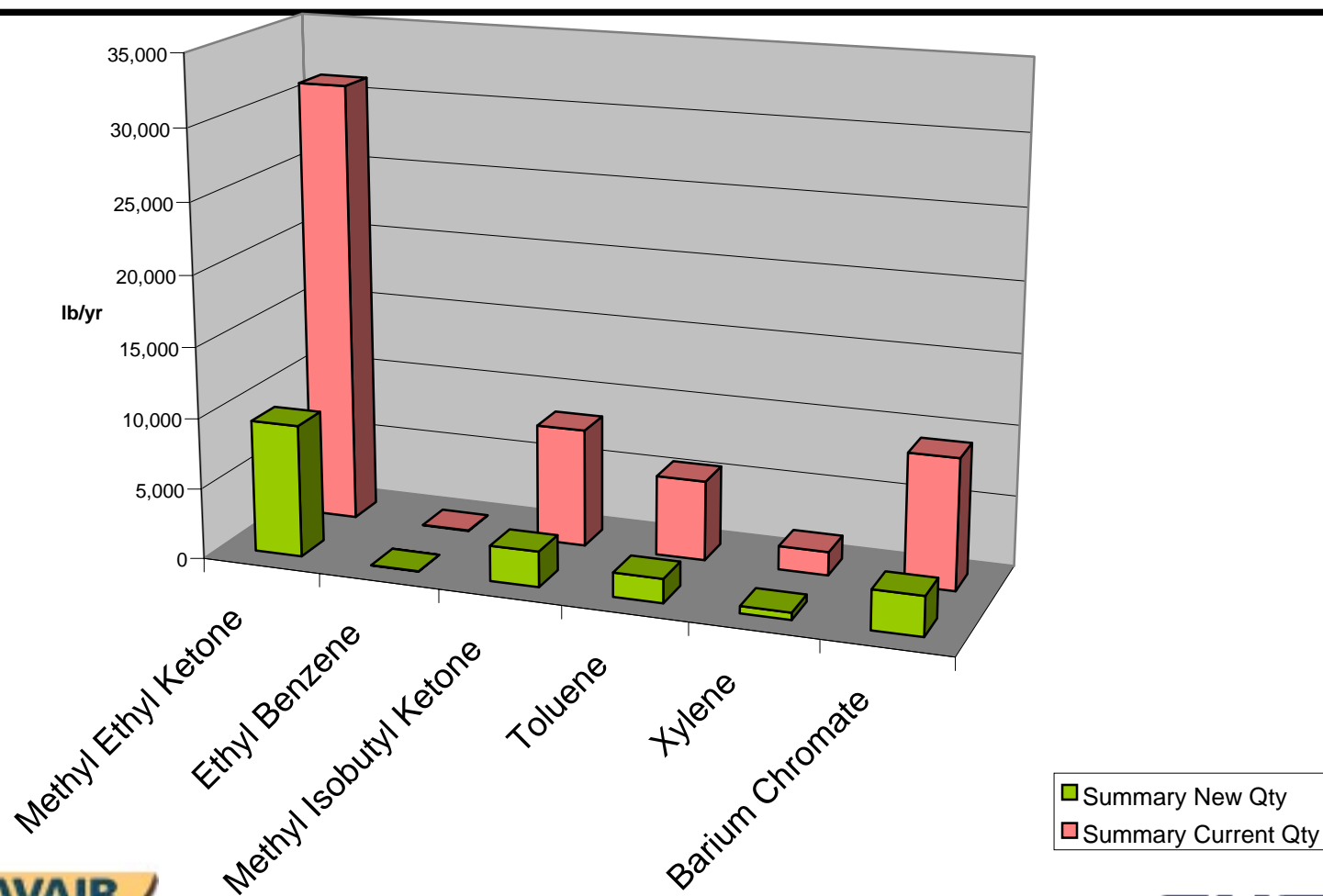
Multiple Site Deployment Sensitivity Analysis

Non-HAP Chemical Paint Stripper



Powdercoat vs. Spray Paint

Assess Environmental Impact



Results

- **Impact Analysis Users:**
 - Headquarters:
 - **Develop Resource Requirements**
 - **Assess Alternatives**
 - Technology Managers & Site Users
 - **Optimum Deployment Strategy**
 - **List of Candidate Sites for Deployment**
 - **Assess Cost & Environmental Impacts from Technology Evaluation Results**

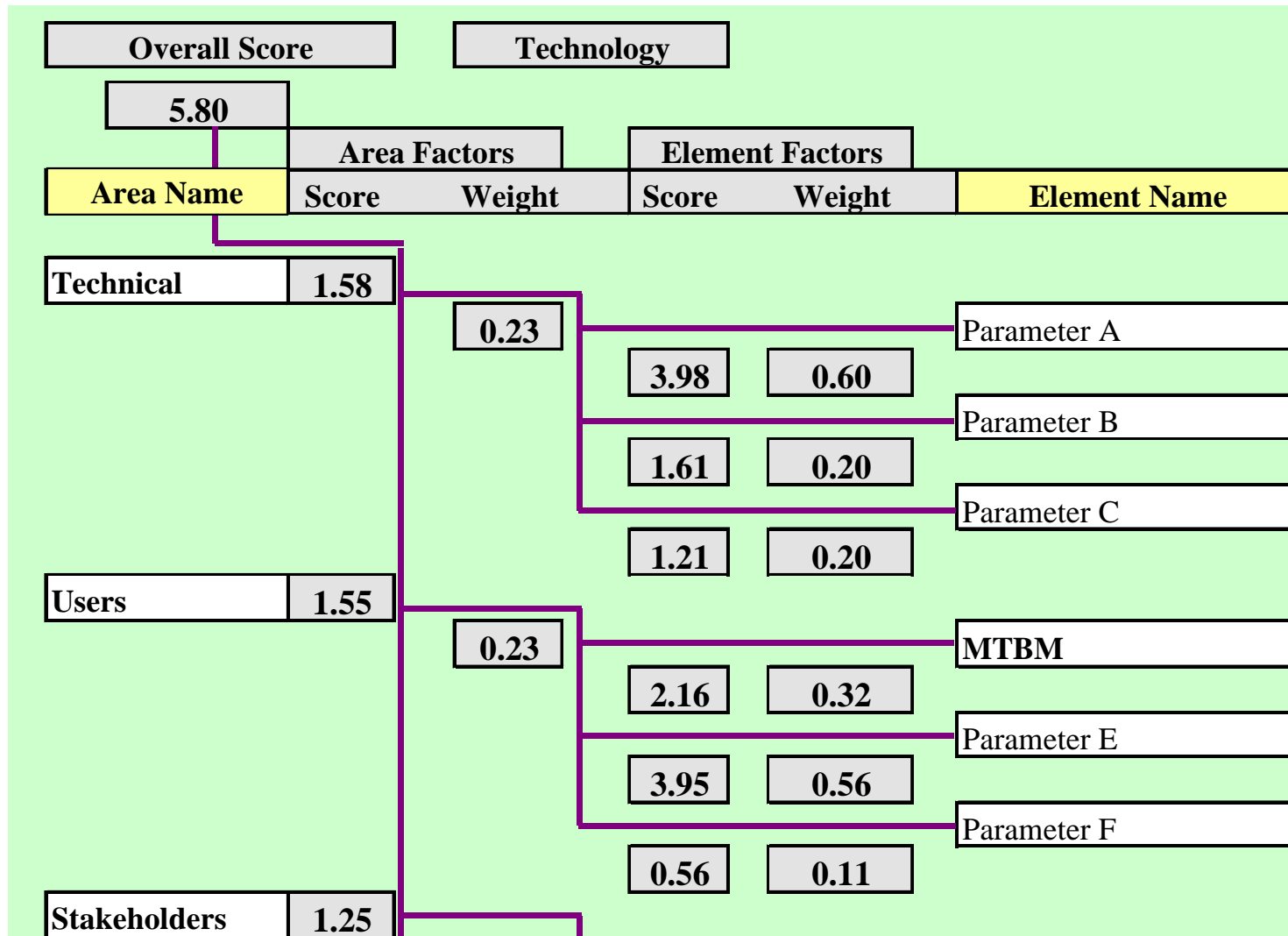


New Development: Integrated Technology Assessment Tool

- **Measure Technical Performance Criteria**
 - Requirements & Specifications
 - Environmental, Safety & Health
 - Technical Cost Drivers
- **Apply throughout Technology Evaluation and during Field Implementation**
- **Integrated Technical, Cost, and Environmental Assessment**
 - Linked to Impact Analysis Technology Assumptions

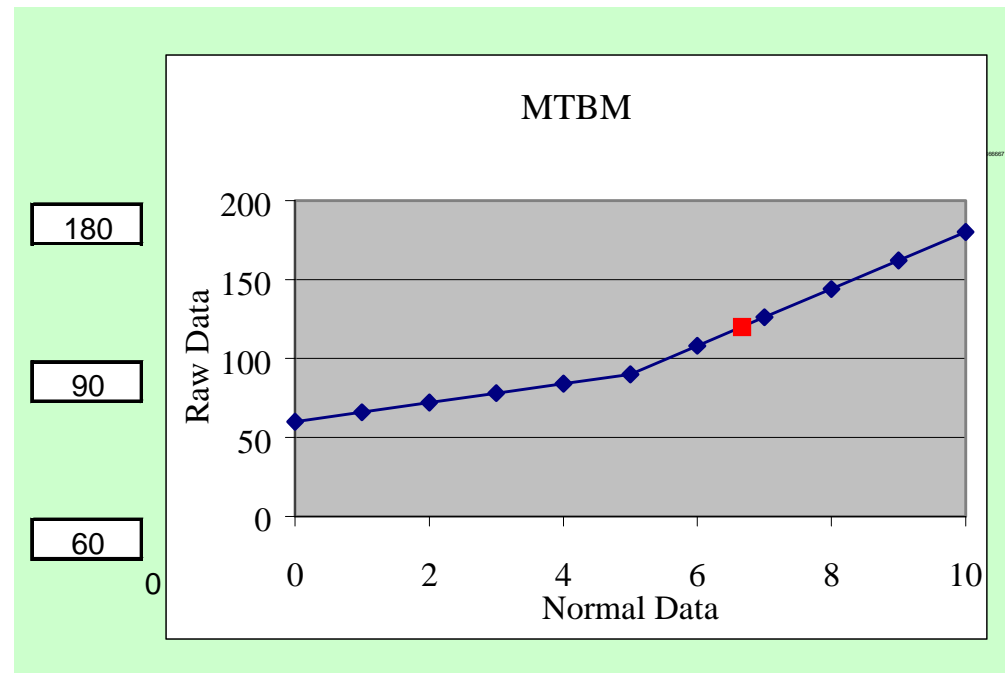


Technology Assessment Tool Analytical Hierarchy



Apply both Qualitative and Quantitative Assessment Parameters

- **Qualitative:**
 - Compare New Technology to Old
- **Quantitative:**
 - Test Results versus Specifications
 - Built-in Data Normalization Function



Questions?

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